

CLAIMS

1. An optical switch intended to be mounted between first optical lines (L1, L2) each comprising one or more optical channels (G11 to G14, G21 to G24) having a rank within their optical line and one or more second optical lines (L1', L2'), each comprising one or more optical channels (G11' to G14', G21' to G24') having a rank within their optical line, characterised in that it comprises:
  - 10 selection means (MS) comprising at least one selection element (Sel) suitable for selecting a single optical channel from among a set of at least two optical channels of the first optical lines (L1, L2) or second optical lines (L1', L2'), the optical channels of this ensemble having the same rank, the selection element (Sel) comprising at least one deviation element (l1) such as a lens associated with at least one deflection element ( $\mu$ l1) such as a mirror suitable for assuming several angular positions,
  - 15 connection means (MC) suitable for coupling the selected optical channel to one of the channels of the second optical lines or of the first optical lines respectively.
- 20 25 2. The optical switch as claimed in claim 1, characterised in that it is reversible.
- 30 3. The optical switch as claimed in any one of claims 1 or 2, characterised in that one of the positions is a rest position located between two active positions.

4. The optical switch as claimed in any one of claims 1 to 3, in which each of the optical channels is intended to convey a light beam ( $\phi_{1a}$ ,  $\phi_{1b}$ ),  
5 characterised in that, when the deviation element is a deviation lens (l1), the optical channels of the ensemble are placed such that the light beams originating from said optical channels take their origin at the focal point object of the deviation lens,  
10 the deflection element ( $\mu_{1l}$ ) being placed at the focal point image of the deviation lens (l1).

5. The optical switch as claimed in any one of claims 1 to 4, characterised in that the selection elements (sel) are combined into one or more selection modules (MSe, MSS).  
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6. The optical switch as claimed in claim 5, characterised in that each selection module (MSe, MSS) comprises N selection elements connected in parallel, the deviation elements just the same as the deflection elements of these N selection elements being arranged as small rods of N elements.  
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25 7. The optical switch as claimed in any one of claims 5 or 6, characterised in that the connection means (MC) are located between two selection modules (MSe, MSS).

8. The optical switch as claimed in any one of claims 5 or 6, characterised in that the connection means (MC) are located after a selection module (MSe).

5 9. The optical switch as claimed in any one of claims 1 to 8, characterised in that the connection means (MC) comprise at least one optical connection in free or guided space.

10 10. The optical switch as claimed in claim 9, characterised in that the connection in free space comprises at least one small rod of lenses (Bl2).

15 11. The optical switch as claimed in any one of claims 1 to 10, characterised in that the connection means (MC) comprise a liaison module (ML).

20 12. The optical switch as claimed in any one of claims 1 to 11, characterised in that the connection means (MC) include point-to-point switching means (MCP).

25 13. The optical switch as claimed in claim 12, characterised in that the point-to-point switching means (MCP) comprise a cascade with a first deflection module (MDE), a liaison module (ML), a second deflection module (MDS).

30 14. The optical switch as claimed in claims 6 and 13, characterised in that the first and second deflection modules (MDE, MDS) are made from small rods

similar to those utilized for creating the selection modules.

15. The optical switch as claimed in any  
5 one of claims 13 or 14, characterised in that the  
cascade is inserted between a first shaping module  
(Ble1) and a second shaping module (Ble2).

16. The optical switch as claimed in claims  
10 6 and 15, characterised in that the first and second  
shaping modules (Ble1, Ble2) are made from small rods  
similar to the small rods of deviation elements  
utilized for creating the selection modules.

15 17. The optical switch as claimed in any  
one of claims 13 to 16, characterised in that a  
deflection module (MDE, MDS) of the point-to-point  
switching means (MCP) comprises one or more conjugation  
elements (a1, a1') between one or more first deflection  
20 elements (F1, F2) and one or more second deflection  
elements (F1', F2').

18. The optical switch as claimed in claims  
6 and 17, characterised in that the conjugation  
25 elements (a1, a1') of a deflection module are arranged  
in the small rod similar to a small rod of deviation  
elements utilized for a selection module.

19. The optical switch as claimed in claims  
30 6 and 17, characterised in that the first and second  
deflection elements are arranged as small rods similar

to the small rods of deflection elements of the selection modules.

20. The optical switch as claimed in any 5 one of claims 17 to 19, characterised in that one or more deflection elements of at least one deflection module (MDE, MDS) of the point-to-point switching means (MCP) are combined with one or more deflection elements of the selection means.

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21. The optical switch as claimed in any 15 one of claims 1 to 20, having  $2N$  input channels and  $N$  output channels, characterised in that the selection means (MS) comprise a selection module made up of  $N$  selection elements mounted in parallel, and in that the connection means (MC) comprise a point-to-point switch (MCP)  $N \times N$ , the selection module and the point-to-point switch being made from small rods of  $N$  lenses and small rods of  $N$  mirrors suitable for assuming at least two 20 angular positions.

22. The optical switch as claimed in any 25 one of claims 1 to 20, having  $2N$  input channels and  $2N$  output channels, characterised in that the selection means (MS) are formed by an input selection module (MSe), an output selection module (MSs) and the switching means (MC) of a point-to-point switch (MCP)  $N \times N$  located between the input selection module (MSe) and the output selection module (MSs), the selection 30 modules (MSe, MSs) being made up of  $N$  selection elements mounted in parallel, these selection modules

and the point-to-point switch being made from small rods of N lenses and small rods of N mirrors suitable for assuming at least two angular positions.

5           23. An optical switch having  $2N$  input channels and  $N$  output channels, characterised in that it comprises selection means (MS) formed by a selection module made up of  $N$  selection elements mounted in parallel, connection means (MC) formed by a point-to-point switch (MCP)  $N \times N$ , the selection module and the point-to-point switch being made from small rods of N lenses and small rods of N mirrors suitable for assuming at least two angular positions.

15           24. An optical switch having  $2N$  input channels and  $2N$  output channels, characterised in that it comprises selection means (MS) formed by an input selection module (MSe), an output selection module (MSs) and switching means (MC) formed by a point-to-point switch (MCP)  $N \times N$  located between the input selection module (MSe) and the output selection module (MSs), the selection modules (MSe, MSs) being made up of  $N$  selection elements mounted in parallel, these selection modules and the point-to-point switch being made from small rods of N lenses and small rods of N mirrors suitable for assuming at least two angular positions.